AMENDMENT TO THE CLAIMS

1. (Currently Amended) A flow-through conductivity sensor, the sensor comprising:

a flow conduit;

first and second electrodes disposed relative to the flow conduit to contact process fluid proximate the conduit and convey an electrical current between the first and second electrodes through the process fluid;

a current return conductor coupled to the first and second electrodes; and

at least one toroid arranged to interact with the current return conductor to provide an indication of process fluid conductance.

2. (Original) The sensor of claim 1, wherein the at least one toroid is disposed about the current return conductor.

3. (Original) The sensor of claim 2, and further comprising:

a second toroid disposed about the current return conductor; and

wherein one toroid is a drive toroid and the other toroid is a detect toroid.

4. (Original) The sensor of claim 2, wherein the at least one toroid is configured as a transformer.

5. (Original) The sensor of claim 2, wherein the at least one toroid has a pair of windings, and one of the pair of windings is in series with the current return conductor.

6. (Original) The sensor of claim 1, wherein at least one of the first and second electrodes is a contact ring.

7. (Original) The sensor of claim 1, wherein one of the first and second electrodes includes a conductive process pipe.

8. (Original) The sensor of claim 7, wherein the other of the first and second electrodes includes a contact ring.

9. (Currently Amended) The sensor of claim 7, wherein the other of the first and second electrodes includes a metal pipe disposed between a pair of insulating pipes, wherein each insulating pipes includes insulating ends and an insulating liner.

10. (Original) A method of measuring conductivity of a process fluid in a flow conduit, the method comprising:

contacting the process fluid with first and second electrodes coupled together by a current return path;

generating an electrical current in the process fluid with a drive toroid; and

measuring current through the current return path.

11. (Original) The method of claim 10, wherein measuring includes coupling a receive toroid to the current return path.

12. (Original) The method of claim 10, wherein generating includes coupling the drive toroid to the current return path.

13. (Original) The method of claim 10, wherein measuring includes directly measuring impedance of a toroid coupled to the current return path.

14. (Original) A method of measuring conductivity using a flow-through conductivity sensor, the method comprising:

generating a current in a process fluid using at least two electrodes;

selecting a measurement regime for measuring the generated current;

measuring the current with the selected measurement regime; and

providing an indication of conductivity based upon the measured current.

15. (Original) The method of claim 14, wherein selecting a measurement regime is done using an electrical switch.

16. (Original) A system for measuring conductivity of process fluid in process piping having a conductive inner surface and a pair of ends, the system comprising:

a first electrode coupled to one of the pair of ends, the first electrode being electrically coupleable to the process fluid;

a second electrode electrically coupleable to the process fluid and electrically isolated from the pair of pipe ends; and

means for generating a current within the process fluid; and

means for measuring the generated current to provide an indication of conductivity.

17. (Original) The system of claim 16, wherein the means for generating includes a toroid.

18. (Original) The system of claim 16, wherein the means for measuring includes a toroid.

19. (Original) The system of claim 18, wherein the toroid is configured as a transformer.

20. (Original) The system of claim 16, wherein the means for generating includes means for directly measuring conductivity using the two electrodes.

21. (Original) The system of claim 16, wherein the second electrode includes a contact ring.

22. (Original) The system of claim 16, wherein the second electrode is a conductive pipe, and wherein the second electrode is insulated from the pair of pipe ends by a pair of pipes each being disposed between the second electrode and one of the pair of ends, and each having an insulative layer that isolates the second electrode.